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SELECTED TRANSLATIONS ON COMMUNIST CHINA'S CHEMICAL INDUSTRY

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SELECTED TRANSLATIONS ON COMMUNIST CHINA'S CHEMICAL INDUSTRY

Following is a translation of selected articles from the Chinese-language periodical Hua-hsueh Kung-yeh (Chemical Industry), Peiping, No. 3, 6 February 1960. Page and author, if any, are given under individual article headings.

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# I. A SIMPLE METHOD OF CARBON BLACK PRODUCTION BY MEANS OF AN ABRASIVE-RESISTANT FURNACE

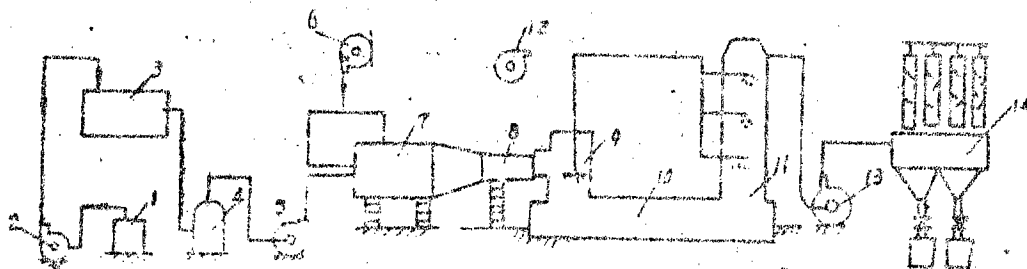
Pages 24-25

Tientsin City  
Carbon Black Plant

Following the success of the experimental production of carbon black with an abrasive-resistant furnace, this plant, based on the existing available techniques plus the decision to use little or no steel in construction, produced in 3 days of continuous work a simple abrasive-resistant furnace for the production of carbon black; the equipment has since been successfully and smoothly put into production. Up to now, the operation has been very satisfactory with a rate of 100 kilograms per furnace hour; the product is comparable to products produced by imported machinery, and sometimes the quality of our carbon black is even better. We believe that under the present high speed development of China's carbon black industry, the full implementation of the party's policy of walking on both legs and the promotion of the simple abrasive-resistant process are truly significant.

## A. Explanation of the Production Process

The production of carbon black by means of the abrasive-resistant furnace process is based on the incomplete combustion and heat cracking reaction when oil and air of a definite ratio are injected into the furnace under certain temperature conditions. The final product is formed when there is completed a cycle of quenching, activation, cooling, collection and wrapping. The production process is given below:



Gas tar, the raw material, is stored in tank (1) and is pumped to the dehydration tank (3) by means of pump (2), dehydration is performed by means of direct heating in the range of 90-100° C. The dehydrated gas tar which is then pumped into the gas tar pipe inside the furnace by means of a high pressure oil pump (5) after passing through filter (4) is atomized and injected into the furnace in the form of fine particles by means of the nozzle at the tip of the pipe; in the meantime, air of definite volume is sent into the carbon black reaction chamber both from the axial and the tangential directions by a high pressure blower (6). Under high temperature condition (1,380 - 1,400° C), fine oil particles form carbon black and other gases after undergoing incomplete combustion and cracking process. Hot carbon black mixture gas is quenched to 600-800° C by the cooling water sprayed by pump (12) after reaching the quenching section (9) via the gas channel (8); the quenched gas is then sent to the atomizing cooling tower (11) via the activation gas channel (10). The temperature of the carbon black gas mixture is further cooled to 230-250° C inside the tower by the cooling water sprayed by pump (12); the gas is then transferred to bag filter (14) by means of an exhaustor (13). Inside the bag filter (14), carbon is being continuously separated and caught by a funnel where the product is packed and inspected before being put into storage.

## B. Technical Conditions

### 1. Specifications of raw material (gas tar).

viscosity (100° C): 1.72 poise  
 flash point (open): 99° C  
 distillation fraction: below 170° C -- 0.1%  
                                   170-230° C -- 8.4%  
                                   230-270° C -- 15.45%  
                                   270-300° C -- 3.25%  
                                   300-360° C -- 12.25%

### 2. Gas mixture composition inside the gas channel (dry volume %):

CO<sub>2</sub> -- 4.32%  
 CnHm -- 0.12%  
 O<sub>2</sub> -- 3.15 %  
 CO -- 14.31%  
 CH<sub>4</sub> -- 1.10%  
 H<sub>2</sub> -- 4.90%  
 N<sub>2</sub> -- 72.10%

### 3. Quality of carbon black product:

#### (a) Results of property test:

coloring ability	--	124
moisture	--	1.97%
dust	--	0.05%
volatile portion	--	3.8%
D.P.G. absorption	--	17.5%
pH value	--	7.0

#### (b) The physical and mechanical properties of rubber made of this type of carbon black are given in Table 1 below:

Table 1

Vulcanization condition		Tensile strength	Elongation,	Wear	Stress at 300% elongation,	Hardness	Permanent deformation,
Temp	Time	kg/cm <sup>2</sup>	%	cm <sup>3</sup> / 1.61 km	kg/cm <sup>2</sup>	(shao scale)	%
142°C	10 min.	177	515		68.1	59	50
	15 min.	240	545		85.5	62	32.8
	20 min.	273.7	567		93.8	64	30
	30 min.	300	570		112.5	66	28.1
	40 min	309	555	0.271	119	66	30

#### 4. Gas tar and air ratio :

In actual operation, the gas tar-air ratio should be constantly adjusted to maintain it at a constant level, which is determined by the practical situation according to the quality of the product.

#### 5. The ratio of axial and tangential air intake.

The more the axial air intake the less is the carbon black production, however, the granules are in finer form. The volume of tangential air intake has little effect on the quality and quantity of carbon black produced, but it has a definite effect on the furnace temperature. The actual ratio of these two air intakes should be determined by the practical cases.



6. Oil temperature and pressure.

The oil furnace inlet temperature should be maintained near 90° C, so that atomization can be performed conveniently. Oil pressure should be maintained above 6 kg/cm<sup>2</sup>.

7. Axial air velocity.

The velocity of axial flow air should have a high velocity so that atomization can be easily performed.

8. Temperature-pressure index of production system.

(a) Temperature:

combustion chamber	--	1,370° C
after quenching	--	650° C
after cooling tower	--	220° C
before entering bag filter	--	120° C.

(b) Pressure:

inside the furnace	--	15 mm H <sub>2</sub> O
exhauster inlet	--	35 mm H <sub>2</sub> O
Bag filter inlet	--	120 mm H <sub>2</sub> O

C. Major Equipment List

The equipment used in this simple device is given in Table 2. A total of 4 tons of steel is used.

Table 2. Major Equipment List

<u>Item</u>	<u>Principal characteristics</u>	<u>Quantity</u>
1. Oil pump for dehydration	Flow rate -- 5 m <sup>3</sup> /hr; pressure -- 3 kg/cm <sup>2</sup>	1
2. Dehydration tank	Capacity -- 4 m <sup>3</sup> ; φ 1400x2600, steel	2
3. Filter	φ 300x850 (mm), steel	2
4. High pressure oil pump	Flow rate -- 1 m <sup>3</sup> /hr; pressure -- 6-9 kg/cm <sup>2</sup> ; steel	1

<u>Item</u>	<u>Principal characteristics</u>	<u>Quantity</u>
5. High pressure blower	Flow rate -- 2100 m <sup>3</sup> /hr; air pressure -- 600 mm H <sub>2</sub> O	1
6. Carbon black reaction furnace	Chamber wall is made of refractory bricks and the outer wall is made of ordinary bricks; asbestos is sandwiched in between these brick walls, steel rods are also added to reinforce the structure, preventing cracks caused by furnace body expansion.	1
7. Quenching device	φ 500x800 (mm); with atomizer and cooling jacket; steel	1
8. Cooling tower	Inner wall uses clay refractory bricks and outer wall uses ordinary bricks, asbestos is sandwiched in; the outer surface of the tower is painted with caulking powder; φ 450 mm; over-all height -- 5 m.	1
9. Exhauster	Flow rate -- 4600 m <sup>3</sup> /hr; air pressure -- 1600 mm H <sub>2</sub> O; steel	1
10. Atomization water pump	Flow rate -- 2-3 m <sup>3</sup> /hr; pressure -- 3 kg/cm <sup>2</sup>	1
11. Bag filter	Filtering area -- 250 m <sup>2</sup> ; four chambers; funnel is made of asbestos plate	1
12. Hole-plate flow rate meter		2
13. Thermal couple (high temperature)	Temperature range -- 1200-1600° C and 500-900° C each	2

#### D. Operational Conditions

In the operation of the past two months, no cracking has been discovered in the furnace chamber, brick-lined cooling tower, carbon black and gas mixture channels (φ 300 mm ceramic pipes). Owing to the thick furnace wall, thermal insulation is pretty good; the fluctuation of furnace temperature due to short duration

stop of operation is very little; therefore, both the quantity and quality of the product are uniform. Because of the high efficiency of the quenching device, normal operation of the bag filter can be maintained even without water spray inside the cooling tower. We expect the life span of the brick lined cooling tower will be longer than a steel structure. Due to the good thermal insulation efficiency of ceramic pipes, no steam condensation has been discovered on the pipe wall; meanwhile, the corrosion-resistant ceramic pipe reduces the mechanical impurities in carbon black. This action has a definite effect on the improvement of the quality of carbon black produced.

#### E. Principal Technical and Economic Indexes

The production of every ton of carbon black by means of the abrasive-resistant furnace process uses 4 tons of gas tar, 2.5 tons of cooling water, 200 kilowatts of electricity, and 0.5 tons of coal.

In general, we believe that the greatest advantage of the simple abrasive-resistant furnace process is the corrosion-resistant property of the equipment; it not only reduces the impurity of carbon black, but also greatly increases the life span of the furnace. Therefore, the use of this native method at a time when we must save steel certainly possesses significance both politically and economically. However, owing to some complications in production control, some steel materials that are still being used in the equipment (such as for the indirect reduction of the water content in steam, in the cyclic separator in the collection of carbon black, etc.), are being improved.

## II. INITIAL EXPERIENCE IN RAISING OUTPUT RATE OF AGRICULTURAL CHEMICALS IN KIANGSU PROVINCE

Pages 33-34

Bureau of Heavy Industry,  
Kiangsu Province

Last year, this province, under the guidance of the light of the general line and the leadership of the Ministry of Chemical Industry, and of the party's provincial and local secretaries, plus the great effort of the masses, achieved a continuous great forward leap, bettering the successes achieved in agricultural chemical production in 1958. According to preliminary statistics, the total production of agricultural chemicals in 1959 was 11,589.75 tons which is 138.84% of the 8,637 tons specified in the first state plan, 115.9% of the 9,700 tons in the second plan, and 6.8 times what had been achieved in the 1958 great forward leap. A comparison of the output of major items during these two years is given below: production of Ti-pe-ch'ung is up 26.7 times, polybarium sulfide is up 36.5 times; dinitrobenzene sulfocyanate is up 4.07 times, and all other finished insecticides have also been sharply increased. The total value of production in 1959 almost doubled 1958. Furthermore, the quality of agricultural chemicals has also been improved; for instance, the content of Ti-pe-chung has reached 70%; the content of barium sulfide in polybarium sulfide has reached a steady level of 40-45%, etc. There were 14 new items successfully produced in 1959; among them, I-ma-lung and ethyl Ma-la-sung are high-efficiency insecticides. Basic costs in making those chemicals have also been lowered. In addition, inspection and supervision programs have been strengthened to ensure a product of better quality. To promote the application of these insecticides, work has been carried out and more than 200 persons have been technically trained to add new blood to this force. The completion of national plans and the fruitful results of the program have once more proved that our general line for socialist construction is correct and that our party's leadership is brilliant.

Reviewing the work of the past year, we are of the following opinion on the production of agricultural chemicals.

There are many different kinds of farm insecticides, especially for the prevention of wheat rust. However, based on the actual raw material situation, technical condition, and the needs of agricultural departments in this province, we believe that our best program should be primarily based on the production of polybarium sulfide plus some dinitrobenzene sulfocyanate. According to preliminary tests and Soviet reports, the former offers very good result in combating wheat rust; furthermore,

it is easy to produce, requires little equipment and only a short time is needed for furnace construction. In general, it offers a quick start. Besides, if mixed with limestone, one quarter of the amount of sulfur normally used can be saved. Barytes, which is used as a raw material, exist in great quantity in this province, and mining can be quickly organized. Various areas also possess the capability for the crushing of barytes. Based on all these conditions, a large program aiming at the production of polybarium sulfide as the main product plus the promotion of the production of other insecticides was established in various areas of this province. The program put emphasis on "homemade furnace first, modern furnace follows; mining first, transportation next; crushing, first, treatment next; product first, adjustment and shipping next." Therefore, a hot polybarium sulfide production program was quickly developed. For example, 120 homemade refractory furnaces were completed in the Cheng-kiang district within one week. They have the capability of producing 1,900 tons of semi-finished chemicals per month. Power equipment was kind of short in the chemical plant of Nan-tung Hsien, but two tractor engines were quickly and timely sent to them by the hsien's party secretary. The result was that 300 refractory furnaces with a capacity of 3,000 tons per month were completed within two months. Similarly, the production of dinitrobenzene sulfocyanate also followed thoroughly the policy of "use native method first, adjust to local conditions." For instance, the native method is used to make carbon bisulfide for the production of ammonium sulfocyanate in the Nanking Chemical Plant; and Soochow City uses synthetic methods to produce dinitrobenzene sulfocyanate from other organic items. After quality control was improved, Nan-tung City was able to raise the percentage of first grade polybarium sulfide from 12% to 65%, and the content of barium-sulfide was maintained at 40-45%.

### III. CHEMICAL INDUSTRY NOTES

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Authors as noted

#### A. Dairen Chemical Plant Completed 180-Ton Daily Rate Coke Furnace

Ke Po

After studying Shih-ching-shan Steel Company's experience in the construction of its Red Flag coke furnace by using the native-modern approach, the Dairen Chemical Plant spent only 8 months, 50 tons of steel, and one million yuan investment in its construction of a Red Flag coke furnace, which has recently been put into operation producing 180 tons of coke daily to supply the basic needs of the plant. The completion of this furnace again demonstrates the correctness and greatness of the party's large-medium-small simultaneous approach and policy of combining native-modern methods.

#### B. Calcium Superphosphate Equipment Completed at the Canton East Sulfuric Acid Plant in Three Days

Unsigned

At the end of 1959, the Canton East Sulfuric Acid Plant used only three days to complete its 1,500 ton annual rate calcium superphosphate equipment. Trial runs show satisfactory operation, and more than 600 kilograms has been produced.

The flow sheet is simple and the technique is easy to control. The equipment used only 100 kilograms of steel, 10 tons of cement, 1.5 cubic meters of lumber, 2,000 bricks, one 2.8-kilowatt motor, and some porcelain containers and pipes. The total investment is only about 2,000 yuan.

#### C. New Blood for Calcium-Magnesium-Phosphorus Fertilizer Production in Kwangsi Province

Hu Shao-kang and Ho Chi-kuang

Under the leadership of the party's district and local committees and with the assistance given by fraternal plants, the Kwangsi Yi-shan Chemical Plant, with two and one half months great effort on the part of its vigorous members, completed a 10,000-ton annual rate calcium magnesium phosphorus fertilizer plant which was formally put into production last January. By now, the daily production has reached 28.5 tons, and the proportion of effective phosphorous is above 15%. Because of the special precaution given to economy and the substitution of white marble for olivine and white coal for coke, the cost of production has been cut down to a very low level, only 90 yuan per ton.

#### D. Technical Reform in Shanghai Reagent Factory

Shen Chung-liang

Members of the Shanghai Reagent Factory, which overfulfilled last year's production plan 62 days in advance, have again won the "open door victory" on the first day of 1960. They not only produced more products but also made technical reforms.

On that day, the sixth group of the first plant adopted a piping system and automation which increased productivity five times and brought their third grade products to second grade. The second plant's automatic dryer and automatic filtering device has been put into production and tested satisfactorily. To solve the problem of raw material shortage, the 7th alcohol section of the fourth plant successfully prepared "poly formol." Comrades of the third plant have learned to cut down the consumption of acetic acid in the oxidation of acetaldehyde. This will save 4 tons of chromium acetate annually and cut down basic costs by 30,000 yuan.

#### E. Chungking Tien-yuan Chemical Factory Invented New Light Weight Cyclic Type Crane

Unsigned

In the realization of this year's rapid mechanization and automation plans, members of the machinery repair shop in the Chungking Tien-yuan Chemical Plant quickly collected some used materials and on 7 January successfully completed Chung-tien -- an automatic cyclic-type light weight crane. Testing results show that the use of this crane in the shipping of oil products will increase the working efficiency five times; in hoisting coal, the efficiency is doubled, moreover, the labor of 12 men is saved.

The successful completion of this crane will gradually eliminate the heavy physical work and establish better shipping facilities to ensure the supply of raw materials.

#### F. Large Scale Chemical Fertilizer Production in the Loyang District to Basically Ensure a Supply for Cotton and Wheat Farms

Hu Hsien-tsung

To ensure this year's bumper harvest, the Loyang District in Honan Province, based on the spirit of supporting agriculture by industry, on the policy of thoroughly carrying out the union of large-medium-small industries and of native and modern dual approach, has mobilized all the people in the district to participate in an ambitious chemical fertilizer production plan,

with a result that many small chemical fertilizer plants have been established in the cities, hsiens, and communes. There is now a spectacular tide of people's chemical fertilizer production. By 14 January of this year, the Loyang District had established 1,205 chemical and chemical fertilizer plants, produced 1,508 tons of chemical fertilizer, 55,882 tons of native type chemical fertilizers (mainly phosphorous, calcium superphosphate, calcium magnesium phosphorous fertilizers, etc.), and 459,238 tons of granule fertilizers. These products have basically ensured a supply of fertilizers for growing cotton and wheat and have powerfully supported the effort to increase agricultural production.

G. "Red Flag" Awarded to the Chemical Experimental Factory in the Peiping City Native-Method Sulfuric Acid Interplant Competition

Hu Tou-nan

During last year's fourth quarter native-method sulfuric acid interplant competition at Peiping, the Peiping Chemical Experimental Plant won the glorious title of "Red Flag" plant.

Workers of the sulfuric acid shop of this plant, guided by the light of the party's general line, especially after the 8th Central Committee meeting of the Party's 8th Congress, energetically participated in the technical reform movement through various actions, including anti-rightist activity and diligent study. They have conducted numerous experiments on fluoride, arsenic and dust removal, and improved some of the equipment and flow sheet shortages. For example, their improvements lengthened the life of the pump base of the acid pump. In addition, various technical exhibitions and competitions stimulated further investigations. One of the results of these measures was an increased native method production of sulfuric acid. The national plan for 1959 was overfulfilled by 12%. Noticeable accomplishments were also reported in lowering raw material consumption, improving product quality, and raising labor production efficiency.



IV. NATIONAL LIST OF MODERN RED FLAG CHEMICAL INDUSTRY  
UNITS FOR 1959

Pages 62-65

Unsigned article

A. Specially Awarded Units

Medicine

Shanghai Biochemistry Pharmaceutical Plant  
Szechwan Pei-lin Antibiotics Plant  
Shanghai 4th Pharmaceutical Plant

Rubber

Mukden Industrial Rubber Company  
Shanghai First Great China Rubber Plant  
Tsingtao 6th Rubber Plant  
Tientsin Rubber Products Plant  
Tientsin Carbon Black Plant

Dyestuffs

Second Shanghai China Dyestuff Plant  
Kirin Dyestuff Plant

Plastics

Chungking Plastics Factory

Alkalies

Shanghai Tien-yuan Chemical Factory  
Yung-li-chiu Tak Plant  
Sodium Bicarbonate Shop of the Chingwangtao Yao-hua  
Glass Factory  
Fuchow Second Chemical Plant

Insecticide

666 shop of the Mukden Chemical Factory  
Szechwan San-tai Hsien Insecticide Plant

Paint

Tientsin Paint and Dye Factory

### Organic Material

Kirin Carbide Factory  
Carbide shop of the San-min Chemical Factory  
Hsi-hsin Solvent Factory

### Acid

Sulfuric Acid Shop of the Nanking Yung-li-lin Factory  
Sulfuric Acid Plant of the Hu-lu-tao 401 Factory  
Wu-hsi Union Chemical Fertilizer Factory  
Sulfuric Acid Shop of the Second Experimental Factory of  
the Shanghai Research Institute  
Canton Nitrogen Fertilizer Factory

### Chemical Fertilizer

Kirin Fertilizer Factory  
Calcium Magnesium Phosphorous Fertilizer Shop of the  
Kunming Phosphorous Fertilizer Factory  
Szechwan Chemical Factory

### Mining

Chin-ping Phosphorous Mines  
Hsiang-shan Pyrite Mines  
Szechwan Hsin-wen Hsien Kwei-chia-yen Sulfur Mines

### Hsien and Commune Industries

Ta-chi Hsien Chemical Plant  
Mou-chi Shan Commune Chemical Plant  
Ping-liang Hsien Kung-tung Commune Chemical Fertilizer Plant  
Fukien Nan-an Chemical Plant  
Ho-fei City Chu-shan Commune Chemical Fertilizer Plant

### Large Complex Industry

Kirin Chemical Industry Company

### Machinery Repairing

Machinery Repair Shop of the Nanking Yung-li-lin Factory  
Mukden Rubber Mechanical Factory

Construction and Installation Industry

6th Field Shop of the Lan-chou Chemical Factory  
Construction and Installation Company of the Taiyuan  
Chemical Factory

B. Winning Units

Peiping City

Peking Pharmaceutical Factory  
Peking Chemical Factory  
Peking Yi-wu Chemical Factory  
Peking Hsi-sze Chemical Factory  
Peking Tire Manufacturing and Reconditing Factory  
Peking Rubber Products Factory  
Peking Hsien-wu Glass Factory  
Peking Enamel Plant  
Peking Synthetic Fiber Factory

Hopeh Province

Tientsin General Insecticides Factory  
Tientsin Chemical Factory  
Yung-li-chiu Taku Plant  
Tientsin Pharmaceutical Factory  
Northern China Oxygen Factory  
Sixth Tientsin Dyestuff Plant  
Sulfuric Acid Shop of the Chang-chia-kou Leather Products  
Factory  
Sulfuric Acid Shop of the Pao-ting General Chemical Factory  
Tang-shan Suburban Chemical Plant  
Chang-chia-kou Hu-chuan Sulfur Mines  
Ping-shan Chemical Fertilizer Factory  
Northern China Pharmaceutical Plant  
Tientsin Nitrogenous Fertilizer Factory  
Tientsin Carbon Black Factory  
Tientsin Paint and Dyestuff General Factory  
Tientsin Rubber Products Factory  
Tientsin City Third Rubber Products Plant  
Sodium Bicarbonate Plant of the Chin-huang-tao Yao-hua  
Glass Factory

Inner Mongolia Autonomous Region

Ch'ih-feng Pharmaceutical Plant  
Yu-shu-wan Sulfur Mines

Tung-liao Chemical Factory  
Pao-to City Oxygen Factory  
Paotow City Cooperative Chemical Factory

Shansi Province

Electrolysis Shop of the Taiyuan Chemical Factory  
Sulfuric Acid Shop of the Taiyuan Chemical Factory  
Shansi Phosphorous Fertilizer Factory  
Taiyuan Plastics Factory  
Oxygen Shop of the Shansi Chemical Factory  
Ta-tung Pharmaceutical Plant  
Wu-tai Chin-kan-ku Sulfur Plant  
Ta-shih-wan Sulfur Shop of the Ho-chu Lung-kou Sulfur Factory  
Hsin-ting Hsien Wei-hsin Commune Chemical Plant  
Third Shop of the Yun-cheng Yen-yeh Chemical Bureau  
Sodium Carbonate Shop of the Yun-cheng Yen-yeh Chemical Bureau  
8th Shop of the Yun-cheng Yen-yeh Chemical Bureau  
Ping-lu Hsien First Sulfur Plant  
Chang-yeh City Wei-hsin Chemical Plant  
Second Shop of the Yang-cheng Tung-yeh Sulfur Factory  
Sulfur Shop of the Yang-cheng Chuan-mo-kou Sulfur Factory  
Yang-chuan City Fifth Sulfur Factory  
Yang-chuan City Sulfur Powder Factory  
Yang-chuan City Hen-ta Chemical Factory  
Construction and Installation Company of the Taiyuan  
Chemical Factory  
Computing Machine Group of the Installation Company of  
the Taiyuan Nitrogenous Fertilizer Factory  
Construction Company of the Taiyuan Nitrogenous  
Fertilizer Factory  
Operation Group of the Mechanization Station of the  
Taiyuan Nitrogenous Fertilizer Factory  
Electrical Group of the Installation Company of the  
Taiyuan Nitrogenous Fertilizer Factory

Kirin Province

Tire Shop of the Ch'ang-ch'un City 8th Rubber Factory  
Chi-an Boron Factory  
Oil Black Plant of the Liao-yuan First Chemical Factory  
Ch'ang-ch'un City Plastics Factory  
Kirin City Second Chemical Factory  
Kirin Chemical Industrial Company  
Dyestuff Shop of the Kirin Chemical Industrial Company  
Fertilizer Shop of the Kirin Chemical Industrial Company  
Carbide Shop of the Kirin Chemical Industrial Company

Ming-cheng Mines of the Kirin Chemical Industrial Company  
Steel Shop of the Kirin Chemical Industrial Company  
Construction Unit of the Kirin Chemical Industrial Company  
Machinery Plant of the Kirin Chemical Industrial Company  
Carpenter Shop of the Steel Plant of the Kirin Chemical  
Industrial Company

Liaoning Province

Mukden Chemical Factory  
666 Shop of the Mukden Chemical Factory  
Northeast General Pharmaceutical Plant  
Dairen Dyestuff Factory  
603 Shop of the 6th Northeast Pharmaceutical Factory  
Third Boron Shop of the Liao-yang 375 Factory  
Sulfuric Acid Shop of the Hu-lu-tao 401 Factory  
Sulfuric Acid Plant of the Second Coke Shop of the  
Pen-hsi Steel Company  
Mukden Paint Factory  
Mukden Oil and Fat Chemical Factory  
Mukden Rubber Industrial Product Factory  
Mukden City Tien-lin Rubber Factory  
Dairen Oil Fat Chemical Factory  
Port Arthur and Dairen Potassium Chloride Factory  
6th Shop of the An-tung City An-tung Pharmaceutical Factory  
An-tung City An-tung Second Chemical Factory  
Fu-shun First Petroleum Refinery  
Sulfuric Acid Shop of the An-shan Steel Company General  
Chemical Factory  
Fu-shun Hua-feng Chemical Factory  
Fu-shun City Second Chemical Factory  
Hsin-peng Pyrite Mines  
Machinery Shop of the Chin-hsi Chemical Factory  
Organic Glass Shop of the Chin-hsi Chemical Factory  
Anti-corrosion Shop of the Branch Institute of the  
Chin-hsi Chemical Design Research Institute  
Intermediate Shop of the Branch Institute of the  
Chin-hsi Chemical Design Research Institute  
Feng-cheng Erh-tai-tze Boron Plant  
Liao-yang Medical Equipment Factory  
Dairen Chemical Factory  
Machinery Shop of the Dairen Chemical Factory  
Mukden Rubber Machinery Factory  
Carbon Black Plant of the Fu-shun Mine Bureau  
Dairen First Plastics Factory  
Mukden Industrial Rubber Company

### Heilungkiang Province

Shao-chou Chemical Factory  
Shui-cheng Nitrogenous Fertilizer Factory  
Chia-mou-szu Plastics Factory  
Tsitsihar City Rubber Factory  
Fu-lar-chi Carbide Factory  
Harbin Pharmaceutical Factory  
Harbin Chemical Laboratory  
Harbin Paint Plant  
Harbin Chemical Rubber Factory  
Heilungkiang Chemical Factory  
Carbide Plant of the Harbin Chemical General Factory  
Mutan Kiang Pharmaceutical Factory  
Mutan Kiang Chemical Material Factory  
3rd Shop of the First Plant of the Hua-lin Rubber Factory  
Lung-kiang Synthetic Factory  
Sodium Carbonate Shop of the Chia-mou-szu Foods Plant  
Harbin City Second Carbon Vulcanization Plant  
Mou-chi-shan Commune Chemical Plant

### Shanghai City

China Mineral Industry Raw Material Factory  
China Gas Factory  
Chin-hsin Chemical Factory  
Second Great China Rubber Factory  
Wan-kuo Rubber Factory  
Shanghai Chemical Factory  
Min-hua Rubber Factory  
Wusung Sulfuric Acid Plant of the Shanghai Sulfuric Acid Factory  
Catalyst Shop of the Shanghai Tung-yung Pharmaceutical Factory  
Shanghai Lee-min Pharmaceutical Factory  
First Great China Rubber Factory  
Shanghai Biochemical Pharmaceutical Factory  
Shanghai 4th Pharmaceutical Factory  
Shanghai Second China Dyestuff Factory  
Shanghai Tien-yuan Chemical Factory  
Nitric Acid Plant of the Second Laboratory of the Shanghai  
Chemical Research Institute  
Oxygen Plant of the Second Laboratory of the Shanghai  
Chemical Research Institute  
Sulfuric Acid Plant of the Second Laboratory of the Shanghai  
Chemical Research Institute (for the 4,000 ton contact process)

Kiangsu Province

Nanking Chemical Factory  
Nanking Plastics Factory  
Nanking Rubber Factory  
Nanking Chiang-tung Chemical Factory  
Chin-lin Chemical Factory  
Chun-chung Chemical Factory  
Chiang-lin Chemical Factory  
Wuhsi Rubber Factory  
Wuhsi Resin Factory  
Wuhsi Electrical Factory  
Wuhsi Insecticide Factory  
Sulfuric Acid Plant of the Wuhsi Refinery  
Hsi-hsin Solvent Plant  
Soochow Pharmaceutical Plant  
Chin-ping Phosphorous Mines  
Soochow Insecticide Factory  
Chang-hsu Tung-hsieh-cheng Plastics Factory  
San-wu Chemical Factory  
Cheng-chiang Lien-yeh Electrical Factory  
Wu-chin Chemical Factory  
Yi-hsin Chemical Porcelain Factory  
Chang-chou Refinery  
Chang-chou Union Chemical Factory  
Chang-chou Chemical Building Materials and Equipment Factory  
Nan-tung Rubber Factory  
Nan-tung Pharmaceutical Plant  
Nan-tung Acetic Acid Factory  
Chi-tung Chemical Factory  
Hsu-chien Phosphorous Fertilizer Factory  
Sodium Carbonate Shop of the Kuang-hua Chemical Factory  
Hsu-chou Plastics Factory  
Hsu-chou Ku-lou Oil Chemical Factory  
Hsu-chou Carbide Factory  
Yang-chou District Pyrite Mines  
Tai-hsin Chemical Factory  
Yang-chou Red Flag Chemical Fertilizer Factory  
Hsien-yang Pharmaceutical Factory  
Yang-ma Commune Chemical Plant  
Hsin-hai Lien-huang Sulfur Factory  
Hsu-chou Rubber Factory  
Public Utility Company of the Nanking Chemical Industrial Corporation  
Machinery Repair Plant of the Public Utility Company of the Nanking Chemical Industrial Corporation

Chemical Machinery Manufacturing Plant of the Nanking Chemical Industrial Corporation  
Sulfur Shop of the Phosphorous Fertilizer Factory of the Nanking Chemical Industrial Corporation  
Machinery Repair Shop of the Phosphorous Fertilizer Factory of the Nanking Chemical Industrial Corporation  
Soochow Sulfuric Acid Factory  
Chang-chou Dyestuff Factory  
Soochow Carbon Black Factory  
Iron Smelting Shop of the Nanking Chemical Industrial Corporation  
Sulfuric Acid Plant of the Yung-li-lin Factory of the Nanking Chemical Industrial Corporation  
Machinery Repair Shop of the Yung-li-lin Factory of the Nanking Chemical Industrial Corporation

Chekiang Province

Chemical Shop of the Min-san Pharmaceutical Plant  
First Mining Area of the Ping-yang Joint Alum Mining and Processing Company  
Chia-hsin Insecticide Factory  
Huang-yen Chemical Factory  
Lan-hsi High Furnace Calcium Magnesium Phosphorous Fertilizer Factory  
Ta-tung Electrical Factory

Kiangsi Province

Kan-nan Chemical Factory  
Chang-hsu Phosphorous Fertilizer Factory  
Fu-ho Chemical Factory  
One award reserved (to be determined by the Kiangsi Province Chemical Industry Bureau)

Shantung Province

Tsinan Yu-hsin Chemical Factory  
Tsinan Yung-lin Pharmaceutical Plant  
Tsinan Rubber Factory  
Tsingtao 6th Rubber Factory  
Jih-tai Hsien Kung-li Commune Chemical Fertilizer Plant  
Tsingtao 2nd Rubber Factory  
Tung-tai Rubber Factory  
Hsin-hua Pharmaceutical Plant  
Chang-tien Pharmaceutical Plant  
Tzu-po Red Clay Plant  
Chu-cheng Chemical Fertilizer Factory



Liang-shan Bacteria Fertilizer Factory  
Kao-mi Hsien Chemical Factory  
4th Shop of the Tsingtao Szu-fang Chemical Factory  
Magnesium Sulfate Shop of the Tsingtao Shih-yeh Chemical Factory  
3rd Shop of the Tsinan Chemical Factory

Hupei Province

Wuhan City Chiu-an Pharmaceutical Plant  
Wuhan City Ke-lien Chemical Factory  
Wuhan City Hupei Pharmaceutical Plant  
Wuhan Pharmaceutical Factory  
Wuhan City Han-chang Chemical Factory  
Wuhan City Hsin-kang Chemical Factory  
Ichang City Sulfuric Acid Factory  
Ichang Hsien Sulfuric Acid Factory  
Ichang Hsi-lin Chemical Factory  
I-tu Chemical Fertilizer Factory  
Hsiang-fan Sulfuric Acid Factory

Hunan Province

Heng-yang District Chien-heng Chemical Factory  
Leng-shui-tan Chemical Factory  
Ta-lee Chemical Factory  
Chang-lin Alum Factory  
Pin-hsien District Lai-yang Chemical Factory  
Hsiang-tan District Ping-teng Chemical Factory  
Hunan Insecticide Factory  
Lin-hsiang Chemical Factory  
Hsiang-tan City Chemical Factory  
Sang-chih Wu-lee-hsi Sulfur Mines  
Chi-shui Chemical Factory  
Chang-teh District Hunan Realgar Mines  
Tao-chiang Vulcanization Factory  
I-yang Sulfuric Acid Factory  
Shao-yang District Shao-yang City Chemical Factory  
Yao-tou-shan Sulfur Mines  
Changsha City I-hua Chemical Factory  
Chien-hsiang Paint Factory  
Lee-hua Rubber Factory  
Changsha City Red Flag Chemical Factory  
Hsiang-chiang Chemical Factory  
Hunan Pharmaceutical Plant  
Insecticide Shop of the Chu-chou Chemical Factory  
Heng-yang Plastic Products Factory

### Honan Province

Loyang Tire Factory  
Chengchow City Rubber Factory  
Kai-feng City Rubber Products Factory  
Sheng-chu Hsien Chemical Factory  
Chiu-tso Sulfuric Acid Factory  
Loyang Sulfuric Acid Factory  
Chemical Plant of the Cheng-chou City "1 July" Commune Water  
Conservation Bureau  
Tang-ho Chemical Factory  
Chi-yuan Chemical Factory  
Chi-yuan Hsia-yeh Sulfur Mines  
Chang-chou Insecticide Factory  
Hsu-chang City Suburban Chemical Fertilizer Factory  
Chia Hsien Chemical Factory  
Chang-ping Hsien Chemical Factory  
Lin-ju Phosphorous Fertilizer Factory  
Wei-shih First Chemical Fertilizer Factory

### Anhwei Province

Hofei Integrated Chemical Factory  
Hofei City Chu-shan Commune Chemical Fertilizer Factory  
Wuhu City Chang-chiang Chemical Factory  
Wuhu Feng-huang Paint Plant  
Wuhu Lien-mang Chemical Fertilizer Factory  
Peng-pu Chiang-huei Chemical Factory  
An-ching Paint Factory  
Hai-shan Complex Chemical Factory  
Anhwei Province Commerce Bureau Pharmaceutical Factory  
Hsiung-shan Pyrite Mines  
Chu Hsien Chemical Factory  
Wan-chiang Hsien Chemical Factory  
Po Hsien Chemical Factory  
Yao-hsi Hsien Chemical Factory  
Carbide Shop of the Hofei Chemical Factory

### Fukien Province

Foochow Antibiotic Plant  
Foochow Pharmaceutical Factory  
Foochow Second Chemical Factory  
Chien-ao Chemical Factory  
Nan-an Chemical Factory  
Carbide Shop of the San-min Chemical Factory

### Kwangtung Province

Canton Nitrogenous Fertilizer Factory  
Ke-san Printing Ink Plant  
National Eleventh Rubber Factory  
Tung-chu Sulfuric Acid Factory  
Nan-hai Chemical Fertilizer Factory  
Hsin-chun Pharmaceutical Factory  
Ho-pu Tien-shan Integrated Smelting Factory  
Fan-kou Integrated Chemical Factory  
Hsiang-hsiu-li Shop of the Ho-chi-kung Pharmaceutical Plant  
Tung-feng Hsien Chemical Factory  
Chiang-men Chemical Machinery Factory

### Kwangsi Chuang Autonomous Region

Lu-chou Chemical Fertilizer Factory  
Shang-szu Chemical Factory  
Ching-hsi Ken-tsun Sulfur Mines  
Po-pe Insecticide Factory  
Hypodermic Needle Shop of the Kweilin Pharmaceutical Plant  
Calcium Magnesium Phosphorous Fertilizer Shop of the  
Yun-lin District Chemical Factory

### Szechwan Province

Chungking Chung Nan Rubber Factory  
Chungking Pharmaceutical Plant  
I-lung Chemical Fertilizer Factory  
Tung Shan Calcium Magnesium Phosphorous Fertilizer Factory  
Tung-shan Phosphorous Fertilizer Factory  
Chungking Tire Factory  
400-ton small contact-process sulfuric acid shop of the  
Chungking Insecticide Factory  
Chungking Plastics Factory  
Szechwan Chemical Factory  
San-tai Hsien Native Insecticide Plant  
Pei-lin Antibiotics Plant  
Ta-chi Chemical Factory  
Hsin-wen Hsien Kwei-chia-yen Sulfur Mines  
Lung-chang Gas Well Area of the Southern Szechwan Mine Bureau

### Kansu Province

Lan-chou City Ta-sha-ping Chemical Factory  
Lan-chou Rubber Products Factory  
Lan-chou Bone Fertilizer Factory

Yu-men City Chemical Factory  
Tienshui Pei-tao Commune Chemical Fertilizer Factory  
Lan-chou Chemical Factory  
Construction Company of the Lan-chou Chemical Factory  
Machinery Branch Plant of the Lan-chou Chemical Factory  
Synthetic Ammonia Branch Plant of the Lan-chou Chemical Factory  
6th Working Field Shop of the Lan-chou Chemical Factory  
Lan-chou Chemical Machinery Factory  
Ping-liang City Kung-tung Commune Chemical Fertilizer Factory

Yunnan Province

Kunming Chien-yun Chemical Factory  
Kunming Ta-lee Chemical Factory  
Kunming Rubber Factory  
Kunming Union Pharmaceutical Factory  
Kunming Glassware Factory  
Kunming Yu-hsi Nitrogenous Fertilizer Factory  
Kunming Phosphorous Fertilizer Factory  
Second Shop of the Kunming City Pharmaceutical Factory  
Electrolysis Shop of the Kunming Ta-lee Chemical Factory  
Chu-ching District Chien-chin Chemical Factory  
Hou-ching Hsien Hsin-tsun Sulfur Mines  
Liberation Army Chemical Fertilizer Factory  
Calcium Magnesium Phosphorous Fertilizer Shop of the Kunming  
Phosphorous Fertilizer Factory

Kweichow Province

Hung-yen Chemical Factory  
Tsun-i Chemical Factory  
Red Flag Coal Low-Temperature Distillation Plant  
Sui-yang Hsien Tung-feng Sulfur Mines  
An-lung Hsien Ta-pa Sulfur Mines  
Kweichow Rubber Plant

Shensi Province

Sian Wei-yang Integrated Chemical Factory  
Sian Plastic Products Factory  
Sian Insecticide Factory  
Sian Pharmaceutical Plant  
Sian Chemical Factory

Tsinghai Province

Ts'a-erh-han Potassium Fertilizer Factory  
Ta-tsai-tan Boron Mines  
Tsinghai People's Chemical Factory  
Tsinghai Fertilizer Factory

Ningsia Hui Autonomous Region

Wu-chung Integrated Fertilizer Factory

Sinkiang Uighur Autonomous Region

Casting Shop of the Sinkiang Chemical Industry Bureau of  
the Installation and Engineering Department  
Ta-peng-cheng Chemical Factory

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